Effects of a self-management program on Interdialytic weight in patients undergoing hemodialysis in Indonesia

by Cek Turnitin

พลของโปรแกรมการจัดการตนเองต่อน้ำหนักตัวที่เพิ่มระหว่างการฟอกเลือด
ในผู้ป่วยที่ได้รับการฟอกเลือดด้วยเครื่องไตเทียม ประเทศอินโดนีเซีย*

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บทคัดย่อ

จุดมุ่งหมายของการศึกษากึ่งทดลองนี้มีวัตถุประสงค์เพื่อศึกษาผลของโปรแกรมการจัดการตนเองต่อการเพิ่มขึ้นของน้ำหนักตัวระหว่างการฟอกเลือดในผู้ป่วยไตเรื้อรังระยะสุดท้ายที่ได้รับการฟอกเลือดด้วยเครื่องไตเทียมที่โรงพยาบาล Muhammadiyah Lamongan ประเทศอินโดนีเซีย คัดเลือกผู้ป่วยทั้งหมด 40 ราย เข้าร่วมในการศึกษานี้ตามเกณฑ์การคัดเข้า สุ่มตัวอย่างเข้ากลุ่มทดลอง (n=20) หรือกลุ่มควบคุม (n=20) กลุ่มทดลองได้รับโปรแกรมเป็นเวลา 5 สัปดาห์เพิ่มเติมจากการดูแลตามปกติ ในขณะที่กลุ่มควบคุมได้รับการดูแลตามปกติเท่านั้น โปรแกรมการจัดการตนเองพัฒนาขึ้นตามแนวคิดการจัดการตนเองของ Kanfer เพื่อส่งเสริมพฤติกรรมการจัดการตนเองด้านการควบคุมน้ำในผู้ป่วยไตเรื้อรังระยะสุดท้ายที่ได้รับการฟอกเลือดด้วยเครื่องไตเทียม เครื่องมือวิจัยนี้ได้รับการตรวจสอบความตรงของเนื้อหาโดยผู้เชี่ยวชาญ 5 คน ตลอดจนการให้ข้อเสนอแนะและความคิดเห็นต่อการศึกษาความตรงของเนื้อหามีค่าเท่ากับ 0.96 เก็บรวบรวมข้อมูลการเพิ่มขึ้นของน้ำหนักตัวระหว่างการฟอกเลือดด้วยการชั่งน้ำหนักตัวผู้ป่วยก่อนและหลังการฟอกเลือดในสัปดาห์ที่ 1 และสัปดาห์ที่ 5 ของโปรแกรม วิเคราะห์ข้อมูลโดยใช้สถิติพรรณา การทดสอบค่าทีคู่ และการทดสอบค่าทีอิสระ

ผลการศึกษาพบว่าหลังจากเสร็จสิ้นโปรแกรมในสัปดาห์ที่ 5 กลุ่มทดลองมีการเพิ่มขึ้นของน้ำหนักตัวระหว่างการฟอกเลือดน้อยกว่ากลุ่มควบคุมอย่างมีนัยสำคัญ (p=.002) ผลการวิจัยบ่งชี้ว่าโปรแกรมการจัดการตนเองมีประสิทธิภาพในการส่งเสริมการจัดการตนเองเพื่อควบคุมน้ำในผู้ป่วยและช่วยลดการเพิ่มขึ้นของน้ำหนักตัวระหว่างการฟอกเลือด ดังนั้น จึงควรบูรณาการโปรแกรมการจัดการตนเองเข้ากับการปฏิบัติการพยาบาลสำหรับผู้ป่วยไตเรื้อรังระยะสุดท้ายที่ได้รับการฟอกเลือดด้วยเครื่องไตเทียม

คำสำคัญ: ภาวะน้ำเกิน การฟอกเลือดด้วยเครื่องไตเทียม การเพิ่มของน้ำหนักตัวระหว่างการฟอกเลือด การจัดการตนเอง

Effects of a self-management program on Interdialytic weight in patients undergoing hemodialysis in Indonesia*

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Abstract

The aims of this quasi-experimental study were to examine the effects of a self-management program on interdialytic weight gain (IDWG) among patients with end-stage renal disease (ESRD) undergoing hemodialysis (HD) at Muhammadiyah Lamongan hospital, Indonesia. A total of 40 patients were enrolled in this study according to the inclusion criteria. Participants were randomly assigned to either the intervention (n=20) or control group (n=20). The intervention group received the 5-week program in addition to usual care, while the control group received only usual care. Self-management program was developed based on self-management concept by Kanfer, promote self-management behavior among patients with ESRD undergoing HD on fluid management. The research instrument was examined by five experts for validating the contents as well as seeking suggestions and opinion in the study. The content validity index (CVI) was 0.96. IDWG were collected through measurement of the weight of the patients before and after HD, at the first week and the fifth week of the program. Data were analyzed using descriptive statistics, paired t-test, and independent t-test.

Results revealed that after program completion at week 5, IDWGs of intervention group were significantly lower than those of the control group (p=.002). The findings indicated that self-management program provided an effective practical model for improving patient fluid management and decreasing IDWG. Therefore, self-management program should be incorporated into nursing practice for individuals with ESRD undergoing HD.

keywords: fluid overload; hemodialysis; interdialytic weight gain; self-management

Introduction

In Indonesia, end stage renal disease (ESRD) becoming a serious health problem.[1] Indonesian Renal Registry reported that the number of patients with ESRD undergoing hemodialysis (HD) have been increasing from 52,835 to 132,142.[2] Consequently, it has an enormous impact on the country's health and economy. The Ministry of Health Financing and Health Insurance Center reported that kidney disease treatment become the second-largest health financing after heart disease. In 2012 the total HD treatment costs incurred by the Indonesian national health care insurance amounted to 15,426,435.58 USD.[3] According to reports, 30 to 60 percent of HD patients do not follow fluid consumption guideline.[4] Fluid overload is fluid retention in the body (intracellular/extracellular space), expressed by weight gain in a short period among patients undergoing HD also known as Interdialytic Weight Gain (IDWG). IDWG has been associated with serious complications, such as high blood pressure, heart failure, and even death.[5,6] In the United States, 10–20% of HD patients routinely experience high IDWG.[7] Muhammadiyah Lamongan Hospital, Indonesia also reports that 10% of the patients have fluid overload problems.[8] Furthermore, a conducted study on the association between fluid overload and IDWG in the HD population showed that 38,614 patients undergoing HD and 5,640 patients (14.6%) died due to high IDWG.[9]

The essential aspects of managing fluid overload problem in patients with ESRD undergoing HD is the patient's adherence to recommended treatment,[10] to help patients overcome and change their fluid restriction behavior and to improve personal control.[11] There is growing evidence that behavioral intervention including self-management programs with self-monitoring, behavioral contracts, and positive reinforcement can enhance compliance in this context.[12] Self-management is found to be an important key in the care of patients with chronic disease, which has been successful in various fields.[13] Previous studies have showed that patients who have good self-management in their life are more likely to have good control in the fluid intake, therefore, self-management programs for patients with ESRD undergoing HD need to focus on active participants in the program.[14]

According to the self-management model by Kanfer (1991) self-management consist of three stages including self-monitoring, self-evaluation and self-reinforcement.[15] Many studies examine the effects of self-management in chronic illness patients. However, there are only a few studies that examine the effects of self-management on fluid overload in patients undergoing HD based on the Kanfer model. Howren et al. (2016) explores the impact of behavioral self-regulation intervention on patient adherence to fluid intake restrictions in HD based on the Kanfer's self-management model, the intervention used was an education and support group program. The key aspects of the intervention closely followed Kanfer's self-regulatory framework of self-monitoring, self-evaluation, and self-reinforcement, which are considered critical behavioral skills that patients must develop through active instruction, structured exercises, and repetition.[4]

Kauric-Klein et al. (2017) examined an educational self-management intervention on self-regulation of blood pressure, fluid, and salt intake on chronic HD based on the Kanfer model. The

self-management intervention consisted of two educational sessions; and the component that was designed to assist participants in self-management skills, through monitoring their BP, sodium and fluid intake, and attainment of self-care goals. In this session the activity involved weekly counseling to review patient's logs, answer questions, reinforce patients, offer problem-solving and guidance for unmet goals. These sessions were conducted before and/or during HD. The intervention was associated with a few self-care benefits, such as reduced salt consumption and lower IDWG.[16] In Indonesia, studies conducted on self-management regarding fluid restriction on patients with HD is limited. There were only two studies conducted regarding self-management of fluid restriction in this population. Nursalam (2020) conducted research to assess effects of the fluid management automatic remainder on confidence and compliance of fluid restriction on HD patients. This study used application that consists of a health education menu, a fluid monitoring menu (pooling intake and pooling output), information on fluid status graphs, HD controls, and automatic fluid management reminder features. The result showed that the development of discharge planning automatic fluid management reminder based on android, increased the confidence and compliance of patients undergoing HD in fluid restriction measures, resulting in a decrease in IDWG.[17] Husain et, al. (2020) investigated effects of the peer support program on improving self-management in patients with ESRD undergoing HD, this program was delivered through informational support, emotional support, and mutual reciprocity for 3 weeks. Information included fluid restriction,

nutrition management, treatment management, HD adequation, and emotional management. Findings showed that the peer support program increased self-management in patients with ESRD undergoing HD.[18]

However, only a few studies of self-management interventions conducted in Indonesia based on theoretical concepts in fluid overload among patients undergoing HD. Moreover, only a few health facilities provide empowerment or management programs that applied theory-based to guide the intervention in helping the patient with ESRD undergoing HD to manage their fluid overload. This shows the need to develop an intervention program and test its efficacy in this population. Therefore, the researcher was interested in studying the effect of a self-management program on fluid overload among patients undergoing HD to overcome the problem of fluid overload in these patients and to promote effective self-management.

Objective of the study

This study aimed to examine the effect of a self-management program on IDWG among patients with ESRD undergoing HD.

Materials and Method

Study design: This study was a quasi-experimental study with two group pre-test post-test design.

Sample and Sampling: The sample size in this study was calculated using the difference between two dependent means from the previous study conducted by Howren et al. (2016).[4] The power of the test at 0.80, a significance level of 0.05, and a small effect size of 0.25 were applied. The estimated

sample size was 18 patients each group and to prevent loss of the sample during the study, the researcher adjusted the sample size by adding 10 % drop out rate. Therefore, a sample size of 20 people for each group was obtained. A total of 40 patients were randomly assigned to the intervention or the control groups. The inclusion criteria were: patients with fluid non-adherent as defined by an IDWG > 3% of the dry weight over 4 weeks; age >18 years; be able to read, write and speak in Indonesian or Javanese language; had no severe cognitive impairment, as tested using mini-mental state examination (MMSE) questionnaire; treated with center-based HD for >3 months, with HD frequency of twice per week. Exclusion criteria were having cardiovascular disease (coronary artery disease, myocardial ischemia, cerebrovascular disease, or peripheral artery disease). withdrawal criteria were: had not complete at least one session of the intervention program, and patients' request to withdraw.

The intervention group received the self-management program for 5 weeks, whereas the control group received usual care. Random assignment was performed according to group of the day shift. as the HD unit at Muhammadiyah Lamongan Hospital usually assigns a schedule to the patients two times a week for undergoing HD, the days of shift has been groped for 3 groups. Those undergone HD on Monday and Thursday were assigned into group 1, those undergone HD on Tuesday and Friday were assigned into group 2, and those undergone HD on Wednesday and Saturday were assigned into group 3. The researcher chose two groups randomly by using clustering sampling from these three groups. The names of groups were written on small paper and put it into the box. The first group chosen was the intervention group and the second group chosen was the control group. Later 20 patients undergoing HD from each group were picked up using simple sampling. The researcher wrote all the patients' name on small paper and randomly took the name without putting them back until reaching the number of samples. After careful consideration, then the pair matching technique was conducted using years on dialysis[4,19] because the HD duration has a significant correlation with adherence on fluid intake restriction.[20]

Setting: This study was conducted at the HD unit at Muhammadiyah hospital, Lamongan, East Java, Indonesia. The data were collected from March to April 2021.

Instruments

The demographic characteristic questionnaire

The demographic characteristic questionnaire was established by the researcher to collect the general information of the participants; including age, gender, level of education, co-morbidities (hypertension, diabetes, and/or heart disease), length of time undergoing HD. Data from the renal laboratory were obtained from the electronic medical record, including the patient's dry weight, the prescription volume of fluid, pre-and post-dialysis weights.

Assessment of volume overload

Volume overload in this study was assessed using IDWG, which described as weight gained between HD sessions. The patient's body weight was measured routinely before and after HD. IDWG was calculated as the patient's pre-dialysis weight (I), minus the post-dialysis weight of the previous

HD session (II) and then the difference between the measurement II minus measurement I, divided by measurement II multiplied by 100%, and then the average of each IDWG measurement over 1 month were assessed as IDWG absolute.[21]

The self-management program

The self-management program for patients with ESRD undergoing HD was developed by the researcher from the literature review. The program contents covered both knowledge and skill behavior of the patients, consisting of two parts: 1) Educational part was delivered through educational class and group discussion using PowerPoint and booklet. The topics of the educational part were: A brief review of how and why self-management is important, a review of self-management process (self-monitoring, self-evaluation, and self-reinforcement), and the overview about HD treatment and fluid management. 2) Self-management skill practice in forms of a book record and consultation, designing to assist the active participation of the patients on self-management skills through monitoring their fluid intake. This included three worksheets: Self-monitoring worksheet, self-evaluation worksheet, and self-reinforcement worksheet.

The contents of the booklet were reviewed for content validity by a panel of five experts: 2 experts in nephrological nursing (a head nurse of HD unit of Muhammadiyah Lamongan hospital, and an advance practice nurse in the HD unit Srinagarind Hospital); and three experts in the concept of self-management for patients with ESRD undergoing HD, who were two lecturers of Faculty of Nursing, Khon Kaen University, and a lecturer of Muhammadiyah Lamongan University. Validity test obtained content validity index (CVI) of 0.96, which was considered acceptable. Face validity was confirmed with the two Indonesian nurses who are working in the HD unit; and three Indonesian patients with ESRD undergoing HD were asked to review, identified, and ensure the level of Indonesian language literacy of the self-management program.

Data collection method

After approval from Ethical committee, data collection was carried out with the HD participants following these steps:

Preparation of research assistants

Two research assistants (RA) assisted in collecting data in this study. RA were selected according to the following criteria: being a registered nurse in the HD unit, having prior training in HD care, working at least 3 years in the HD unit. RA were trained by the researcher to be able to collect the data accurately. They were described the study details regarding procedures, data collection method, questionnaire administration, protection of human rights, and informed consent. They were also given time to ask questions about these processes.

Control group

The researcher met the participants in the control group in the first week to explain the technical process to fill the demographic questionnaire. RA collected the data from the participants; including demographic questionnaire, as well as measuring participants' body weight 10 minutes before and after HD. The control group received standard care from the HD unit which

include: Comprehensive assessment of the patient's general condition (pre-HD); physical examination including vital sign measurement (Blood pressure, pulse, body temperature, respiratory rate); edema; IDWG; pain (VAS Scale); risk of falling; allergies; nutrition (malnutrition); assessment of nursing problems/ nursing diagnosis; implementation of HD in accordance with standard operating procedures; monitoring and evaluation of the patient's general condition (pre-during-post); routine assessment of laboratory test including hemoglobin once a month; routine consultation; and a brief instruction of medication follow-up. Besides, the RA met the participants in the control group again in week 5. The patients were assessed for IDWG.

Intervention group

The researcher met the participants in the intervention group in the first week to explain the technical process to fill the demographic questionnaire. RA collected the data from the participants; including demographic questionnaire, as well as measuring participants' body weight 10 minutes before and after HD. After that, the researcher provided the self-management program in the intervention group with a small group of 8 patients. The researcher provided the first part of the program, self-management education package was delivered through PowerPoint presentation using the screen monitor in the HD unit. In the first week, the researcher provided knowledge related to overview of self-management, HD treatment, and fluid restriction management based on the literature review. During the educational part, the participants were also provided patient handbook that consist of

educational material with the same contents as the education material in the PowerPoint. In the second week the participants were asked to practice the self-management skill including the self-monitoring, self-evaluation, and self-reinforcement using the handbook.

Then the researcher has conducted a discussion with the participants to evaluate the existing fluid intake behavior of the participants; identify the obstacles, problems, and behavior that need to be improved; and compared the current fluid intake behavior with the goal setting, which had been either completely or incompletely achieved. Then the participants were asked to attempt self-reinforcement to assisting the patient, obtained reward or punishment toward their current fluid intake behavior based on the self-evaluation. They were encouraged to develop goals improvement, maintenance, and plans for action to achieve the goals for the forthcoming week. During the third week through the fourth week the participants were asked to repeat the same activity (self-management practice), the researcher also provided follow up sessions once a week to report and evaluate their progress in achieving their goals at the end of the follow-up session. And in the fifth week, the researcher evaluated the program to assess effects of the self-management program for patients with ESRD undergoing HD. Moreover, the outcomes were collected by calculating the IDWG of the patients.

Data analysis

Data were analyzed using SPSS program. The statistical significance level was set at 0.05. The demographic data of the participants were analyzed using descriptive statistics and Chi-square

test. The assumptions of normal distribution were tested prior to data analysis, indicating normal distribution thus, the use of t-test was allowed. Paired t-test was used to test the difference between IDWG mean score within the intervention and control groups, at baseline and at post-test. The independent t-test was employed to test the difference between IDWG mean score of the intervention and those of the control groups at post-test.

Ethics: The study was approved by the Research Ethics Review Committee of Khon Kaen University Thailand (No. HE632266 approved on 24 December 2020) and the Ethics Committee of Muhammadiyah Lamongan University (No. 062/EC/KEPK-S1/02/2021 approved on 4 February 2021). Informed consent was obtained from all participants. Important information regarding the research objectives, procedures, risks and benefits of the study, voluntary participation, protection

of confidentiality, and rights to withdraw at any point in the study without consequence on current treatment or hospital service. participants were assured of confidentiality and anonymity and had enough time to ask questions about the study.

Result

A total of 40 HD patients at the Muhammadiyah hospital were assessed for eligibility. The largest percentage of the subjects in the intervention group were female (60%) with had an average age of 43.25 years (SD=10.25). Most of the participants (45%) had secondary school-level education. More than half of the participants (70%) had duration of HD for 1-5 years with an average of 4.65 years (SD=3.08). Most of the patients (75%) had hypertension as the comorbidity's disease. Compared to the control group at baseline, the intervention group had no significantly different patient characteristics (Table 1).

Table 1 Frequency and percentage of participants' characteristics

Variable	Control group (n=20)		Intervention Group (n=20)		P-Value
	F	%	F	%	
Sex					
Male	6	30.00	8	40.00	.50
Female	14	70.00	12	60.00	
Age (Year)					
<40	8	40.00	4	20.00	.38
41-50	7	35.00	9	45.00	
>51	5	25.00	7	35.00	

Table 1 Frequency and percentage of participants' characteristics (Cont.)

Variable	Control group (n=20)		Intervention Group (n=20)		P-Value
	F	**%**	**F**	**%**	
$\overline{X}\pm SD$	48.95±9.53		43.25±10.25		
Level of education					
Primary School	8	40.00	5	25.00	.56
Secondary school	8	40.00	9	45.00	
Bachelor's/ master's degree	4	20.00	6	30.00	
Duration of HD (Year)					
$\overline{X}\pm SD$	4.00±1.94		4.65±3.08a		
1-5 Year	14	70.00	14	70.00	.81
>6 year	6	30.00	6	30.00	
Comorbidity					
Hypertension	15	70.00	12	75.00	.31
Other	5	30.00	8	25.00	

Analysis of IDWG

Independent samples t-test was computed for the difference in the mean IDWG of the participants. After 5-week self-management program, there was no significant difference between IDWG mean score at pre-test (n=20, $\overline{X}$=3.74±0.92) and IDWG mean score at post-test (n=20, $\overline{X}$=3.92,±1.05) of the control group (t=1.56, p=.12, 95 % CI=1.26-0.16); whereas the intervention group was found to have lower IDWG mean score at post-test (n=20, $\overline{X}$=2.67,±1.28) compared to those at pre-test (n=20, $\overline{X}$=4.29, ± 1.27) (t=3.33, p=.002, 95% CI=0.48-1.98) (Table 2).

Table 2 Comparison of IDWG mean scores before and after the program within the control group (n=20) and the intervention group (n=20) using paired t-test.

Variable	Before		After		t	P-Value
	Mean	SD	Mean	SD		
IDWG						
Control Group	3.74	0.92	3.92	1.05	1.56	.12
Intervention Group	4.29	1.27	2.67	1.28	3.33	.002

Discussion

The current study reports the effectiveness of a self-management program for HD patients in managing their fluid intake compared to the standard care. The findings of this study showed that there was IDWG improvement of the participants after participating in the self-management program. This result was in line with previous work, which reported IDWG improvement in the intervention group after completing the self-management program.[4,10,16] The results also indicated that it is possible to promote the self-management program for patients with excess fluid volume undergoing HD in Indonesia.

The self-management program in this study has a positive effect on IDWG. The self-management program consisted of an educational part as well as the skill practice part. It included self-monitoring, self-evaluation, and self-reinforcement, that played an important role in encouraging the adherence of patients with ESRD undergoing HD regarding fluid restriction management. In this study, the self-management program was able to support effective goal achievement in a variety of ways. First, using self-monitoring as a tool to encourage participants to consciously monitor their fluid intake, and raise awareness of their actual behaviors. The second

stage is self-evaluation, in which participants were assisted and encouraged to assess whether their current fluid intake behavior met the desired fluid intake criteria, as well as to identify the fluid intake behavior that needed to be improved, maintained, or changed. Furthermore, in self-reinforcement part, the participants were assisted in deciding whether they wanted to maintain, modify, or improve their fluid intake behavior through self-reinforcement activities. As a result, the participants were encouraged to recognize and comprehend the activities that needed to be carried out to improve their fluid intake behavior.

Furthermore, the self-management program viewed participants as the key of the program because they know what was best for their own lives. As a result, they were able to make their own decisions about goal selection and action plans to achieve the desired behavior. it was discovered that when subjects were actively involved in the self-management program, they demonstrated competence to change their behaviors and a high likelihood of success.[10] These studies back up and demonstrate the effectiveness of using self-management to encourage chronically ill patients to change their behaviors to manage the negative effects

of chronic disease. Another study also using the same strategy including monitoring skill regarding their fluid intake behavior resulting an improvement of IDWG.[7] Furthermore, the researcher assisted the patients in evaluating achievement, assessing difficulty, and setting realistic goals based on the patient's condition and these become significant factors in behavior change.

This study found that IDWG significantly improved after participating in the program. The improvement in the IDWG could be due to several factors: First, the strategy that contributed to the reduction of IDWG was the weekly follow-up and counseling. This stage also provided regular encouragement to the participants; allowing them to continuously improve their knowledge, responsibility, skill, and motivation to achieve their goals. This strategy was used to give patients good or negative feedback on their efforts, as well as the ability to re-formulate the intermediate goal. Because the patient actively participated in the process of reduced fluid intake, this approach is one of the intervention's key strengths. However, the observed effects in this study may be small, therefore, relapse can be occurred. Griva et al. (2017) also reported that the IDWG decrease in the early weeks but increased from the third week to the fourth week. However, it remained significantly lower than the baseline, indicating that the effects remained. Evidence suggests that fluid intake therapies, that included a combination of self-management components (monitoring, goal setting, reinforcement/feedback), were successful in reducing IDWG in HD patients.[22,23] The finding of the study is consistent with previous self-management research.[1,10] As a result, to control IDWG, it is necessary to provide self-management programs that reflect the various attributes associated with self-management.

In conclusion, our study demonstrates significant improvement in clinical parameters (IDWG) by self-management program. The study focuses on fluid restriction in patients with ESRD undergoing HD, therefore, the contents that provided to the patients were more specific and only highlighted on the important information related to fluid restriction management.

There were some limitation of the study. First, this study using the combination of interventions including cognitive and behavioral interventions to provide the basic knowledge and improve the skill of the patients regarding their management on fluid restriction. However, the self-management program was conducted 5 weeks and there is no follow-up session were available after the program, therefore, the relapse might be occurred. Second, this study was conducted only on small size of population, therefore, generalization of the study results might be limited.

Implication

This study finding suggests that nurses should take the self-management program to encourage for fluid management plan to the patients with ESRD undergoing HD for providing better knowledge of fluid management and to assist the patients in managing their fluid intake and make the patients be more confident to take care of themselves about fluid intake management; which are the indicators for control the fluid status, IDWG, and prevent complications. Moreover, the self-management program can develop the nurse competency

to assess the patient, provide knowledge, and stimulate the patient's self-management behavior.

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